

Implications of X17 boson to (D) meson, Charmonium, and (ϕ) meson decays

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The recent ATOMKI experiments provided evidence pointing towards the existence of an X17 boson in the anomalous nuclear transitions of Beryllium-8, Helium-4, and Carbon-12. The favored ranges for X17 boson couplings to u and d quarks are determined through fittings to these nuclear transitions. In this work, we consider X17 boson contributions to the previously measured D meson decays, including $D_s^{*+} \rightarrow D_s^+ e^+ e^-$ and $D^{*0} \rightarrow D^0 e^+ e^-$, as well as the measured decays of $\psi(2S) \rightarrow \eta_c e^+ e^-$ and $\phi \rightarrow \eta e^+ e^-$. Using these data, we perform an independent fitting to the couplings between the X17 boson and various flavors of quarks. This fitting requires a huge X17 boson coupling to the u quark that creates a serious tension with ATOMKI's data. Our analysis models X17 as a vector boson and allows its quark couplings to be generation dependent. The implications of our findings are discussed.

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